REMARKS

Reconsideration and allowance are respectfully requested in light of the above amendments and the following remarks.

A proposed change to Fig. 2 is submitted herewith to overcome the objection thereto.

The specification has been amended for clarity. No new matter is believed to be introduced by this amendment.

Claim 1 has been amended, claim 2 has been canceled, and claims 3-5 have been newly added. The charging mode determiner has been amended to be in non-means plus function format. Support for the newly recited features is provided in Fig. 1 and the specification on page 7, lines 18 and 19, and page 8, lines 8-12.

Claims 1 and 2 were rejected, under 35 USC §103(a), as being unpatentable over JP 2001025161 (hereinafter JP161). To the extent these rejections may be deemed applicable to amended claim 1 and new claims 3-5, the Applicant respectfully traverses.

JP161 fails to suggest the combined features recited in claim 1 of: (1) indirectly charging a backup battery with a main battery, through an intermediary regulator circuit, when the output voltage of the regulator equals or exceeds the voltage of the backup battery and (2) directly charging the backup battery with the main battery when the regulator output voltage is less than the backup battery voltage. This feature provides the benefit of continuing to charge the backup battery, through a direct charging path, when the voltage of the main battery is insufficient to charge the backup battery through the regulator, due to the parasitic voltage drop within the regulator.

In other words, the regulator requires an input voltage that is significantly greater than its rated output voltage so as to generate the regulated output voltage, as illustrated in Fig. 4. When the main battery is highly discharged to a point that it can no longer provide the regulator with the required input voltage, the main battery can still charge the backup battery through a direct connection that bypasses the regulator. Since the main battery is highly discharged, its voltage is reduced to a point that it will not damage the backup battery, whose voltage rating may be lower than that of the main battery, when provided directly.

By contrast to the above-noted claimed features, JP161 discloses that when a microcomputer 5 detects a decrease in the voltage of a backup charging element 8, due to its discharge by a load, microcomputer 5 turns on a switching transistor 13 to provide a path for a main power source 1 to directly charge backup charging element 8. JP161 differs from the above-noted claimed features in that its microcomputer 8 provides the direct charging path based on the detected voltage of the backup battery alone. JP161 does not disclose or suggest providing the direct charging path based on the difference between a regulator output voltage and the battery backup voltage.

The above-described difference between JP161 and the claimed invention is substantial. If the selection criterium for determining the charging path disclosed by JP161 were applied to the present invention, it could harm the circuit components and possibly the users thereof. For example, if the backup battery of the present invention happened to be highly discharged but the main battery was not, the charging path selection criterium disclosed by JP161 would open the direct charging path between the main and backup batteries. If the main battery's voltage exceeds the rated charging voltage for the backup battery, the backup battery could be damaged and a potentially high current flow, due to a potentially extreme voltage drop, could harm other circuit components. For this reason, the claimed invention compares the backup battery voltage to the regulated voltage to determine whether to provide a direct charging path.

In accordance with the above discussion, the Applicant submits that JP161 does not teach or suggest the subject matter defined by claim 1. Therefore, allowance of claim 1 and all claims dependent therefrom is warranted.

Moreover, Applicant submits that the reasoning cited in the Office Action for modifying JP161 to achieve the claimed subject matter does not support the modification proposed in the Office Action. The Office Action proposes that it is well known that battery charges of series-connected batteries tend to equalize (Office Action page 3, lines 14-15). As a result of this tendency, the Office Action proposes that when a backup battery has a lower voltage than the main battery the backup battery will "hog" the output current from the main battery to receive an extra charge and increase its voltage (page 3, lines 12-14).

Regardless of whether the proposed equalization process occurs, however, this reasoning does not support a conclusion that a skilled artisan would be motivated to modify JP161 to provide a direct charging path between a main and backup battery under the claimed conditions. More specifically, simply because series-connected batteries may tend to equalize their respective charges, as proposed in the Office Action, this tendency does not suggest providing a direct charging path between two batteries only when the backup battery's voltage exceeds a regulator's output voltage, as recited in claim 1.

Accordingly, the Applicant submits that the teachings of JP161 would not motivate a skilled artisan to modify the device disclosed in JP161 to achieve the subject matter recited in claim

1. Therefore, allowance of claim 1 and all claims dependent therefrom is warranted for this independent reason.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

Date: June 21, 2005
JEL/DWW/att

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IN THE DRAWINGS

A proposed change to Fig. 2 is submitted herewith, with a Letter to the Official Draftsman.

RELATED ART

FIG. 2